

TECHNICAL REVIEWERS' RATING SUMMARY

R005-B

Corn Oil Extraction

Headwaters Incorporated & Great River Energy
Principal Investigators: Jeff Zueger, Blue Flint Ethanol
Request for \$500,000; Total Project Costs \$2,000,000

<u>Rating Category</u>	<u>Weighting Factor</u>	<u>Technical Reviewer</u>		<u>Average Weighted Score</u>
		<u>1A</u>	<u>1B</u>	
1. Objectives	9	4	3	31.50
2. Achievability	9	4	3	31.50
3. Methodology	7	4	4	28.00
4. Contribution	7	3	2	17.50
5. Awareness	5	3	2	12.50
6. Background	5	4	4	20.00
7. Project Management	2	3	2	5.00
8. Equipment Purchase	2	3	2	5.00
9. Facilities	2	4	4	8.00
10. Budget	2	4	4	8.00
Average Weighted Score		184	150	167.00
Maximum Weighted Score				250.00

OVERALL RECOMMENDATION

FUND

FUNDING MAY BE CONSIDERED

x

x

DO NOT FUND

R005-B
Corn Oil Extraction
Submitted by Headwaters Incorporated & Great River Energy
Principal Investigator: Jeff Zueger, Blue Flint Ethanol
Request for \$500,000; Total Project Costs \$2,000,000

- 1. The objectives or goals of the proposed project with respect to clarity and consistency with North Dakota Industrial Commission/Renewable Energy Council goals are: 1 – very unclear; 2 – unclear; 3 – clear; 4 – very clear; or 5 – exceptionally clear.**

Reviewer 1A (Rating: 4)

The objectives are generally a good fit with the REC. This will effectively boost the transportation fuel output of the plant and the competitiveness of that facility. Of course, the project would be even stronger if the conversion of the oil to biodiesel were to take place in North Dakota. If Blue Flint Ethanol is already capturing waste heat from a coal-fired power plant, then the reported energy savings may be overstated.

Reviewer 1B (Rating: 3)

The PIs proposed to utilize corn ethanol co-product to produce biodiesel. It is very clear and consistent with ND goals. However, “creating a renewable energy market for corn oil” is not clear because the impact of this project on the biodiesel market will be small. The PIs should have mentioned in the proposal how much crude corn oil will be obtained from corn ethanol plants in ND, what the quality of the oil will be for biodiesel production, and how much biodiesel is produced in ND etc. Also, “protecting ND renewable energy jobs” is not very clear because again, the impact of created jobs from the proposed project is very limited and not elucidated in the proposal.

- 2. With the approach suggested and time and budget available, the objectives are: 1 – not achievable; 2 – possibly achievable; 3 – likely achievable; 4 – most likely achievable; or 5 – certainly achievable.**

Reviewer 1A (Rating: 4)

The proposal has very good documentation in this area. The technology has already been demonstrated and is likely already in use at several other ethanol plants in the US.

Reviewer 1B (Rating: 3)

I am not convinced that 1) the quality of corn oil extracted is good enough for biodiesel production without further purification; 2) the process is energy-balance-positive since heating will be used; 3) the value of corn DDGS will be the same if oil is extracted; 4) it is cost effective. How much revenue will be generated vs. cost? I believe the PIs can build the system with the budget available in 5 months, however, if my concerns above are not addressed, it is not likely that the project will sustain, and so the objectives will not be achieved. I was looking for small-scale or even lab-scale tests to show the technical/economic feasibility of the project.

- 3. The quality of the methodology displayed in the proposal is: 1 – well below average; 2 – below average; 3 – average; 4 – above average; or 5 – well above average.**

Reviewer IA (Rating: 4)

Methodology is very sound.

Reviewer IB (Rating: 4)

The technologies (heating, separation and storage) used are well-developed.

- 4. The scientific and/or technical contribution of the proposed work to specifically address North Dakota Industrial Commission/Renewable Energy Council goals will likely be: 1 – extremely small; 2 – small; 3 – significant; 4 – very significant; or 5 – extremely significant.**

Reviewer IA (Rating: 3)

One possible negative is that this is not a very novel idea. On the other hand, it will be helpful to the corn ethanol industry to encourage the further implementation of corn oil recovery.

Reviewer IB (Rating: 2)

The technologies (heating, separation and storage) used are well-developed, so nothing is new in terms of scientific merits.

- 5. The principal investigator's awareness of current research activity and published literature as evidenced by literature referenced and its interpretation and by the reference to unpublished research related to the proposal is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.**

Reviewer IA (Rating: 3)

The proposal did not include much of a review here; however, the technical feasibility is not questioned.

Reviewer IB (Rating: 2)

The PIs should have explained why there is currently no business in ND that is producing corn oil for biodiesel production. One important reason might be the cost. The PIs should have also mentioned and compared current technologies for oil extraction to prove that the proposed one is the best.

- 6. The background of the investigator(s) as related to the proposed work is: 1 – very limited; 2 – limited; 3 – adequate; 4 – better than average; or 5 – exceptional.**

Reviewer IA (Rating: 4)

This is not a complicated project relative to the other operations at Blue Flint.

Reviewer 1B (Rating: 4)

Although the PIs are not involved in oil/lipid business, they are still well qualified for the proposed project.

- 7. The project management plan, including a well-defined milestone chart, schedule, financial plan, and plan for communications among the investigators and subcontractors, if any, is: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – very good; or 5 – exceptionally good.**

Reviewer 1A (Rating: 3)

Good documentation. The partners in this project are suitable.

Reviewer 1B (Rating: 2)

There is no milestone chart, timetable, financial plan or communication plan for this project.

- 8. The proposed purchase of equipment is: 1 – extremely poorly justified; 2 – poorly justified; 3 – justified; 4 – well justified; or 5 – extremely well justified. (Circle 5 if no equipment is to be purchased.)**

Reviewer 1A (Rating: 3)

Comments are similar to #1 above.

Reviewer 1B (Rating: 2)

The PIs should have included a quote/bid/specification for the centrifuge and other extraction equipment to be used in this project.

- 9. The facilities and equipment available and to be purchased for the proposed research are: 1 – very inadequate; 2 – inadequate; 3 – adequate; 4 – notably good; or 5 – exceptionally good.**

Reviewer 1A (Rating: 4)

One drawback is that centrifuges are expensive, but I know of no reasonable alternative for the oil recovery.

Reviewer 1B (Rating: 4)

Although it is not specified what facilities/resources are available, I believe Blue Flint Ethanol should be able to do what are proposed.

- 10. The proposed budget “value”¹ relative to the outlined work and the financial commitment from other sources is of: 1 – very low value; 2 – low value; 3 – average value; 4 – high value; or 5 – very high value. (See below)**

Reviewer 1A (Rating: 4)

This has a very good probability of technical success, and Blue Flint Ethanol is investing a significant amount of their own resources.

Reviewer 1B (Rating: 4)

The PIs asked for only \$500,000 for a \$2M capital investment project with \$1.2M/year operating cost. I would have given a 5 if the PIs proved the project would generate net gain and have an impact on the energy/job market.

- 10a. Financial commitment from other sources – A minimum of 50% of the total project must come from other sources to meet the program guidelines. Higher priority is to be given if the application has private industry investment equal to or at least 50% or more of total cost.**

The minimum 50% cash match is demonstrated.

Section C. Overall Comments and Recommendations:

Please comment in a general way about the merits and flaws of the proposed project and make a recommendation whether or not to fund.

Reviewer 1A (Funding May Be Considered)

The technical feasibility is already proven, and supporting this project will probably aid the productivity and competitiveness of Blue Flint Ethanol, and stimulate further improvement to this type of technology. Some concerns are that the immediate customer is a biodiesel plant in Minnesota, thus the biodiesel conversion will not be in North Dakota, and the size of that biodiesel plant is relatively small. The feed value of the DDGS may be reduced by the removal of the energy-dense oil, but this is not a reason to not fund the project.

Reviewer 1B (Funding May Be Considered)

The major flaw of this proposed project is that it does not assure a profit. Technology wise it is feasible, but if the project does not generate net income, it will not sustain and therefore fail.

If the project is profitable, I can see the value of it. Because of that, my recommendation will be “Funding May Be Considered”. I would suggest the PIs to do a little bit more preliminary research/tests and conduct a detailed cost/profit analysis before resubmitting.